**Socio-Economic Characterization of Farming Communities in Southern Mali**

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**Abstract**

This paper deals with socio-economic characterization of farming communities in two districts of Southern Mali (Bougouni and Koutiala). A participatory method involving stakeholders meeting, focus groups discussions and schedule face to face interviews were conducted and data was analysed using statistical software, SPSS 20. Results indicated presence of weak extension services outside cotton, maize and rice sectors. This weakness constrained the effort to increase major staple crop productions and heightened the risk of market prices. Farmers did not have clear criteria for their choice of cropping pattern. Except for cotton, dissemination strategy and adoption techniques were limited. Costs exceeded revenues due to low sale volumes. The awareness on various cereal and legume crop prices was limited and significant variations of prices were observed in the urban and village markets. Promoting awareness programs on crop productivity and evolving market conditions are crucial. Better agro-advisory services including crop and agricultural input price information through local media, Farmers’ Organization (FOs), local extension services, and farmer to farmer information exchange are required. The majority of FOs in the studied farming communities were formed for self-help. We suggest that FOs should play a crucial role in facilitating implementation of improved practices and new technological options in the farming communities.

**List of Abbreviation**

Africa RISING Africa Research In Sustainable Intensification for the Next Generation

AMEDD Association Malienne d’Eveil au Development Durable (AMEDD),

AV Association Villageoise

BEACIL Bureau d’Etudes et d’Appuis Conseil aux Initiatives Locales

BNDA Banque Nationale de Developpement Agricole

CMDT Compagnie Malienne de Développement Textile

CPC Coopérative de Producteurs de Cotton

EU-CORD Christian Organisations in Relief and Development

FOs Farmers Organization

FtF Feed the Future

GDP Gross Domestic Product

ICRISAT International Crops Research Institute for the Semi-Arid Tropics

IER Institut d’Economie Rurale (IER)

IMF International Monetary Fund

MOBIOM Mouvement Biologique Malien

NGO Non Governmental Organisation

USAID  United States Agency for International Development (USAID)

# **Introduction**

Climate change, land degradation, population growth and over reliance on rainfed agriculture are common social and biophysical constraints to increased agricultural intensification in developing countries particularly; those of rural communities of Sub-Saharan Africa (Ngigi, 2009). The soils in sub-Saharan Africa are inherently poor in fertility characterized by low productivity and; in addition to nutrient scarcity, land degradation and water stress hamper considerably, the agricultural development of the region (Lahmar et al., 2012). These daunting challenges constitute potential setbacks for agricultural development efforts in many countries of sub-Saharan Africa including Mali.

Mali is a landlocked country, located in Western Africa with two thirds of its 15 million inhabitants living in rural areas where t¶he rate of poverty reaches on average 73%, with agriculture contributing to 75% of employment and 40% of the national GDP (IMF, 2013). The Malian economy is based mainly on cotton export which contributes 10% of the national GDP and constitutes the main source of cash for 2.5 million of farmers in the southern part (Valenghi and Guenat, 2001). ¶MalChallenges faced by farmers in Mali particularly in the southern part include among others, excessive rain water during the rainy season, scarcity of water in the dry season and rapid land degradation caused by decades of intensive and extensive cotton cultivation (Sanogo, 2007) consequently, making poverty rampant (Rockström et al; 2007). It was also recognised that yield gaps in the semi-arid humid regions are results of inefficient land, water and crop management practices (Rockström et al; 2010).

Soil erosion by wind and water, soil physical degradation (for example crust development) and salinization are important processes of soil degradation in southern Mali, impoverishing the soils and decreasing food production. During the droughts of the 1970s and 1980s; bare soils were vulnerable to wind erosion, and large areas lost most of their top soils. Winds transported the eroded soils (dust) and deposited them elsewhere forming new layers of topsoil up to a decimetre thick. Water erosion usually occurs on these soils when surface runoff is high and, this erosion is often observed in areas with compacted soils having low water infiltration capacity. Thus, runoff and wind contribute to soil degradation through erosion of the upper layers which ultimately reduce water availability for crops and trees of the parkland (Bertrand and Gigou, 2000).

In Southern Mali, the estimated soil losses in cultivated soils were 25 Kg of N ha-1year-1 and20 Kg of K ha-1 year-1 (Van Der Pol, 1991). The study concluded that 44% of the losses in farmers’ incomes were due to soil depletion. Traditional methods for improving production and preventing soil degradation include pit planting with organic amendments, contour bunding, earthen and stone lines, and damming of gullies. However these methods are piecemeal efforts that did not evolve into precise and efficient soil degradation control measures as they are labour intensive and; with the increasing annual levels of degradation, only translated into marginal yield increase that is not sustainable (Jalloh et al., 2011).

Southern Mali receives mean annual rainfall ranging from 500 mm to 1000 mm with strong variations and irregular rainfall events most of the time. Agriculture is predominantly rainfed and depends on 3 to 4 months of summer rainfall. Rainy season lasts from May to October, with most of the rains falling in the month of August, when the tropical rain belt reaches its north most limits. The growing season starts immediately after the first rains, and lasts a month or two beyond the rainy season. The dry season is from October through April.

Rainfall variability poses one of the biggest obstacles to the achievement of food security and poverty reduction in the region. Recent reports (Serigne et al., 2006; UNEP, 2012) indicated that in West African countries rainfall has become less reliable and growing seasons shorter in many areas, which inevitably require a radical shift in farming practices.

As a response to increased land degradation and water erosion in particular, several natural resources management strategies were implemented that have proven inefficient (Mazzucato et al., 2001). The poor performance of these interventions was associated to the low engagement of local stakeholders. Failure of natural resources management and the combination of environmental costs and socioeconomic impacts had prompted investments in sustainable intensification in sub-Saharan Africa (Zemadim et al., 2013).

In response to the devastating droughts and hunger of the 1970s-1980s, Mali’s agricultural research system increased efforts to improve yields of cereal crops mainly sorghum and millet. The government’s effort was supported by the United Nations Development Program, United States Agency for International Development (USAID) and; from 1975, by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) (Foster, et al., 2015). The effort continued through Africa RISING program since 2012, supported by the USAID Feed the Future (FtF) initiative in Southern Mali. In this paper a study was conducted to characterize the socio-economic conditions of ten farming communities in the two districts (Bougouni and Koutiala) of southern Mali which has been supported by Africa RISING program. The study has the following three research questions:

* What are the roles, functions and legal status of existing farmers’ organizations?
* What is the current status of the cereal based farming system?
* What are the entry points that help to identify and validate scalable options for the sustainable intensification of the cereal-based farming system?

**Methodology**

## **Site characteristics**

The study was conducted in 10 villages located in the two districts of Sikasso region in Southern Mali. In Bougouni district the target villages were Dieba, Flola, Madina, Sibirila and Yorobougoula. Similarly the five target villages in Koutiala district were M’Pessoba, Nampossela, N’Golonianasso, Sirakélé and Zanzoni. Figure 1 presents the communes in which the villages are located. The population and mean annual rainfall in each of the intervention villages were presented as well.

**Soils**

Literature data indicates that the dominant soils in Southern Mali are *Arenosols*, *Lixisols* and *Acrisols*. These soils are inherently fragile, low in carbon and poor in plants nutrients (Serigne et al., 2006). Soils lack phosphorus, nitrogen, organic content, and water retention capacity. In addition the composition of many soils (high levels of sand and silt, and low levels of clay) makes them highly prone to crusting when ‘battered’ by the heavy raindrops, especially during the first storms (Fox and Rockström, 2003). As a result, water runoff rates of 40 percent of total annual rainfall are common in these landscapes.

**Geology**

The bedrock geology in the study area is mainly composed of pre-Cambrian rocks (granites and sandstones) that are deeply weathered. The heavier rains in the south have leached the nutrients down the soil profiles, making the soils therefore; generally poorer. In hilly terrain, weathering of rocks and soils is accompanied by a downward flow of water which leaches and transports the more easily soluble nutrients from hills to valleys. This process typically creates a sequence of soils from hills to valleys, termed a catena.

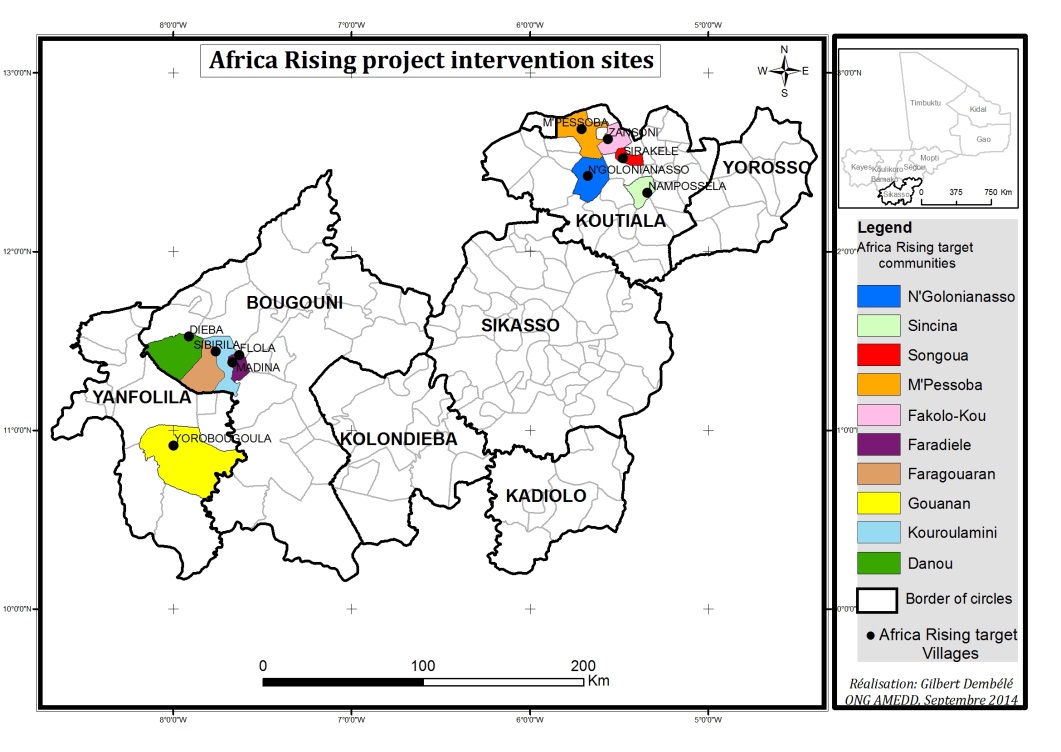


Figure 1: Location of Africa RISING intervention villages in Bougouni and Koutiala districts.

**Crops**

The major staple crops grown in the area are millet (Pennisetumtyphoideum) and sorghum (Sorghum bicolor) and fonio. Maize (Zeamays) becomes dominant south wards. Also largely present in the two districts are groundnuts (*Arachis hypogoea*) and cotton (*Gossypium sp*). Other more water demanding crops including rice (*Oryza sp*.) also grow in irrigated fields adjacent to the rivers or in flood-recession areas, and in lowland plains of the Southern Sudanian and Northern Guinean zones.

The irregular distribution of rainfall in time and space risk within-season dry spells which influences cropping choices. The production potential in the region is considerably low due to the frequency of droughts and other yield-reducing factors such as pests, diseases and weeds. Smallholder farmers get little income from millet and sorghum, the major cereal crops in the region, because of high risks of crop failure and poor road infrastructures and access to markets in rural areas.

Table 1: Population and mean annual rainfall in the target villages

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Commune | Village | Population  (2009 census) | | | Mean Annual Rainfall\*(mm) |
| Male | Female | Total |
| Danou | Dieba | 533 | 588 | 1121 | 571 |
| Kouroulamini | Flola | 219 | 246 | 465 | 615 |
| Faradiele | Medina | 773 | 809 | 1582 | 1179 |
| Faragouaran | Sibirila | 440 | 489 | 929 | 872 |
| Gouanan | Yorobougoula | 1200 | 1233 | 2433 | ID\*\* |
| M’Pessoba | M’pessoba | 4709 | 5153 | 9862 | 547 |
| Sincina | Namposela | 1157 | 1286 | 2443 | 697 |
| N’golonianaso | N’golonianaso | 2157 | 2226 | 4383 | ID\*\* |
| Songoua | Sirakele | 2207 | 2295 | 4502 | 616 |
| Fakolo-Kou | Zanzoni | 1672 | 1791 | 3463 | 354 |
| Total | | 15067 | 16116 | 31183 |  |

\*Averaged data from ordinary rain gauges installed in each village

(Data from 27/08/204 to 09/08/2015). \*\* Insufficient Data (ID)

**Socio-Economic Study**

Sustainable agricultural intensification and management of natural resources require the collective action of FOs and local socio-economic actors (Pretty et al, 2011). A stakeholder consultation that involved meetings and discussions was held with farmers and multidisciplinary teams to collect information on social and economic conditions. Farmers’ organizations (FOs) were entry points to conduct the stakeholders meeting and consultation programs with farmers. Status of each FO was assessed in the targeted villages. In Bougouni district, 28 focus group discussions and 84 face to face interviews were made in total. Similarly in Koutiala district, 29 focus group discussions and 58 face to face interviews were conducted with members of the FOs. In addition a market survey was conducted to study the prices of major agricultural products. The urban markets in Bougouni and Koutiala districts were selected for data collection. Further, the village markets of Dieba and Sibilila in Bougouni district and village markets of M’Pessoba and Sirakele were selected for Koutiala district. In the studied market areas, data collection focused on major cereal agricultural inputs and products mainly cereals (maize, sorghum, millet and rice), legumes (groundnut and cowpea), and agricultural inputs (fertilizers and pesticides). Data was collected from June to December 2014 and was screened to verify the reliability and analyses was done using using SPSS 20.

**Results**

**Roles, Functions and Legal Status of Existing Farmers’ Organizations**

The total number of FOs in Bougouni district were 28 (11% women) and the corresponding figure in Koutiala was 29 (17% women). Profiles of these FOs are presented in Tables 2 and 3 respectively for Bougouni and Koutiala districts.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 2: Profile of the 28 FOs in Bougouni district | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Farmer organizations | 28 | 0 | 12 | 6.00 | 2.568 |
| Age of the President | 28 | 34 | 75 | 50.86 | 8.648 |
| Members in FO | 28 | 10 | 2000 | 135.57 | 407.945 |
| Years of establishment | 28 | 3 | 39 | 13.86 | 9.474 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 3: Profile of the 29 FOs in Koutiala district | | | | | |
|  | N | Minimum | Maximum | Mean | Std. Deviation |
| Farmer organizations | 29 | 5 | 8 | 6.72 | 0.960 |
| Age of the president | 29 | 37 | 64 | 50 | 10 |
| Members in Farmer Organization | 29 | 14 | 450 | 101.59 | 107.912 |
| Years of establishment | 29 | 1 | 50 | 14.59 | 10.342 |

In Bougouni district the villages of Flola and Madina have each 7 active FOs and in Yorobougoula only 4 FOs exist. The oldest FOs were found in Flola and Dieba with more than 30 years of existence. The youngest FOs were found in the villages of Yorobougoula (*CPC3*) and Sibirila (*Djiguifa*) with 3 year of existence each. With 2000 members, the FO of *Sabougnouman* in the village of Madina has the highest number of members (Table 2).

In Koutiala district the availability of FOs were as follows: Zanzoni (6) Nampossela (6), Sirakele (7), N’gollonianaso (8) and M’pessoba (2). The village having the oldest associations is Zanzoni *(Dosorola)* and the youngest FO is found in Sirakele *(Benkan)*. With 450 members the FO of *CpcvBilissila1* in the village of N’golonianaso has the highest number of members (Table 3).

Majority of FOs (43% in Bougouni and 59% in Koutiala) were self-help organizations. Nearly 14% of FOs in Bougouni and 7% of FOs in Koutiala were specialised in cotton production and the remaining FOs group were supported by local NGOs and various research organizations that include research institutes like IER and ICRISAT. Local NGOs, AMEDD, MOBIOM, HELVETAS, the Sasakawa foundation (SG 2000) and national consultancy firms such as BEACIL intervene mostly in capacity building, supplying equipment and seeds to the FOs. CMDT was a major input provider of conventional cotton for FOs in Bougouni district. The major financial partner of the FOs was the Malian Bank for Agricultural Development (BNDA).

The self-help FOs support its members usually through monetary or food loans. FOs provide the necessary seeds and fertilizers to the poor or sick members. Mutual assistance during social ceremonies (marriage, baptism and funeral) was provided by the FOs to its members. To enforce a minimum order and discipline in their organisations; farmers comply with a certain number of rules instituted during the formation of the FOs. Delays were sanctioned with a fine of 50F CFA and non-participation to a collective work was fined 250F CFA. Conflict, verbal violence and disturbance during meeting were also sanctioned. The internal rules were not same according to the production objectives. For instance, members of the FOs producing biological cotton and mangoes in the 5 villages of Bougouni district were forbidden to use chemical fertilizers and pesticides.

The representation of women FOs (11% in Bougouni, and 17% in Koutiala) corresponds well with the minimum national representativeness rate of women in public and other organisations in Mali **(**Union Interparlementaire, 1997). The women FOs have an average of 17 years of existence in the studied villages. While men FOs focus mainly on cotton and staple crops, women FOs were involved in the production of rice, vegetables and livestock farming. This signifies the important role of women in agriculture and village development activities.

Women and youth groups also constitute an important labour pool for agricultural activities though they are not part of the major producer organisations. They were hired by FOs or individuals which through paid labour improve the availability of cash flows to the family. However in rural Mali, women are still lagging in public decision making. The existence of youth association in Dieba for instance, was important where gender issue was predominant in decision making and to household resources access and management.

Tables 4 and 5 present the names of each FOs in each of the villages along with the total number of members and establishment year. Most established FOs share a common vision of *being stronger while together.* The FOs are legally recognized and are not business entities. The main objectives of the established FOs in order of importance were: *sustainable agricultural development*, *food secu*rity *and income diversification*, and *village socio-economic development*.

The larger proportions of the ethnic groups of FOs in Bougouni district were Bambara (44%) and Peul (28%). Others include Minianka (13%), Sarakole (8%) and Dogon (7%). In Koutiala district Minianka constitute the larger proportion (65%) of FOs. Other ethnic groups were Bamabara (17%), Peul (7%), Sarakole (7%) and Senoufo (4%). The ethnic compositions reflect the population settlement in the area. Conflicts were managed friendly through the mediation of family leaders, village notables and the office bearer of the FOs.

Table 4: Characteristics of FOs in the District of Bougouni

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of Village | Number of FOs | Name of FO | Number of members | Establishment year |
| Dieba | 5 | Benkadi  CPC 1  CPC B berian  Grinba  Waratji | 32  40  110  41  60 | 2010  1997  2005  1994  1975 |
| Flola | 7 | CPC Bio  CPC Flola  Dogocela – Koua Tji  Famoussala  Siribala  Tekou Bintou tji  Togorola Tji | 40  150  10  38  12  90  13 | 2007  1994  1984  1990  2005  2000  1984 |
| Madina | 7 | CPC Bio  Cooperative Semenciere  CPC1  CPC2  CPC3  Sabougnuman  Sasakawa Global 2000 | 20  47  40  14  40  2000  50 | 2005  2007  1997  2008  2005  2004  2009 |
| Sibirila | 5 | CPC Bio  Cooperative Mangue Bio  Djiguifa  Dounkafa  Siakiba Nieta | 60  25  60  50  100 | 2003  2003  2011  1993  2009 |
| Yorobougoula | 4 | CPC Bio  CPC 3  CPC Kalifala  Women Livestock Groupment | 30  20  40  10 | 2006  1996  1993  1994 |

Table 5: Characteristics of FOs in the District of Koutiala

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name of Village | Total number of FOs | Name of FO | Total number of members | Establishment year |
| M'Pessoba | 2 | Moribabougou 2 | 41 | 1997 |
| Markatiela | 45 | 1997 |
| Nampossela | 6 | Ngougoua | 72 | 2007 |
| Panafo | 35 | 2009 |
| Moukoulosso | 25 | 1998 |
| Nipagalo | 224 | 2004 |
| Soutoura ton | 34 | 2004 |
| Jiguissèmè | 14 | 2010 |
| N'Golonienasso | 8 | Sotigiso | 84 | 2004 |
| Dioulagui | 80 | 2003 |
| Sisiguesso | 400 | 1997 |
| CPCV1 Dougoutigila | 170 | 2004 |
| Bilissila | 450 | 1993 |
| Finamana | 72 | 2010 |
| Koko | 36 | 1993 |
| Beleda | 200 | 1993 |
| Sirakele | 7 | Benkan | 90 | 2013 |
| Sirakele1 | 100 | 1990 |
| Kologo | 14 | 2002 |
| Panafa1 | 25 | 2008 |
| Faganga Kologo | 75 | 1999 |
| Sirakele2 | 102 | 1992 |
| Wadaouniena | 117 | 1998 |
| Zansoni | 6 | Cooperative Benkadi | 230 | 2002 |
| Oyeti | 25 | 2005 |
| Dosorola | 47 | 1974 |
| Oyere | 33 | 2001 |
| Toukorola | 35 | 2002 |
| CPCV Zansoni | 71 | 40 |

## **Status of the Cereal Based Farming System**

The main cash crop in the intervention villages was cotton with production representing 35% in Bougouni and 29% in Koutiala district (Figure 2). Out of the total 35% cotton production in Bougouni, 8% represent production from biological cotton. Aside cotton farming, farmers produce various crops for self-consumption. These include maize, sorghum, millet, rice, fonio, groundnut and cowpea (Figure 2).

Figure 2: Crop production production in percentage for Bougouni and Koutiala districts

Figure 3 depicts the average yield of crops in both districts, signifying low yield productivity. Relatively rice and maize have better yields per hectare whereas fonio and cowpea have the lowest yield. High yield of maize was explained by the increased soil fertility due to fertiliser application in cotton fields (Vaksman et al, 2006). Rice was applied in small swampy areas, and its production per unit area was high. However, the yield figure couldn’t truly reflect the productivity of rice in Mali. While sorghum is one of the most important cereal crops in Koutiala; maize is the dominant cereal crop in Bougouni.

#### Figure 3: Average crop yield in Bougouni and Koutiala districts

**Agricultural Input Information**

Farmers in the studied villages use varieties of seeds (improved and local), fertilizers and pesticides to improve crop productivity. Improved and local seeds were used at different scale depending on the financial capacity of the farmers and the type of crops produced. The availability of improved seeds locally illustrates the collaboration between local farmers on one hand and seed cooperatives, national and international research institutes (IER and ICRISAT) on the other hand. Seeds used for food crop production are either selected at harvest, bought from the local cooperatives specialised in seed production or directly from the market. Farmers exchange pest resistant seeds quite often. Cotton seed comes primarily from CMDT which is also the fertilizer supplier for cotton production. A bag of 40 Kg cotton seed costs 1,250F CFA. Other seed varieties were also used and supplied from local FOs, NGOs and partner institutions as part of agricultural research and extension services. Prices of seeds depend on the seed type and the supplier.

Fertilizer and pesticide were used mainly for the cotton cash crop. Fertilizer application varies from one crop to the other significantly (Table 6). The rate of fertilizer application for cotton was 195 Kg per hectare in Bougouni district and 260 Kg per hectare in Koutiala district. For maize in both districts, an average of 225 Kg per hectare fertilizer was applied. Fertilizer application for sorghum crop was nearly the same at both districts (Table 6). For cotton farmers, fertilizer was given on credit which is directly deducted from their sales. Aside chemical fertilizers, farmers also apply organic manure to their fields. However; there was no information available on the quantity of organic manure applied per hectare. Pesticides were generally applied only to cotton and were mostly provided by the CMDT.

In a cotton field of 1 ha; a litre of pesticide was mixed with 4 litres of water. Biological cotton farmers in Bougouni district however; applied pesticide made from neem. Post-harvest crop produces were transported in carts to the warehouse and attics for storage. For cotton, seed cotton was sent in sacks to trailer trucks provided by CMDT or to the local storage centres pending the arrival of CMDT trucks. Seed cotton was thereafter weighed to estimate the quantity. For productions other than cotton, the storage was in attics (86%), warehouses (10%) and no storage (4%). Warehouses and attics being family property, storage has no particular cost. Majority of farmers (79%) practice treatment against insects during storage.

Table 6: Fertilization application (Kg/ha) in Bougouni and Koutiala district

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bougouni | | | | | | Koutiala | | | | |
| Crop | N | Mean | Std. Deviation | Minimum | Maximum | N | Mean | Std. Deviation | Minimum | Maximum |
| Cotton | 10 | 195.0 | 36.9 | 100.0 | 250.0 | 5 | 260 | 82.158 | 200 | 400 |
| Maize | 2 | 225.0 | 35.4 | 200.0 | 250.0 | 6 | 225 | 61.237 | 150 | 300 |
| Groundnut | 2 | 28.0 | 2.8 | 26.0 | 30.0 | 4 | 75 | 50 | 50 | 150 |
| Sorghum | 2 | 125.0 | 35.4 | 100.0 | 150.0 | 3 | 133 | 28.868 | 100 | 150 |
| Total | 16 |  |  |  |  | 20 |  |  |  |  |

**Agricultural Market Prices**

Seasonal variations of market prices were studied in the urban and village markets of Bougouni and Koutiala districts for different crops. Stable market price was observed for maize during the data period (Figures 4 and 5). Village market prices of sorghum, millet, groundnut and cowpea were lower than prices of their respective urban market in Bougouni district. In this district, falling prices for sorghum and millet crops were constantly observed during the data period (from September to December, 2014).

Prices of cereals were generally found to be lower than legume crops. In both districts, groundnut and cowpea were found to be expensive in urban and village markets. However, cowpea was found to be expensive at Bougouni than at Koutiala. At Koutiala markets, prices were similar in both urban and village markets and the trend was stable for sorghum and cowpea. Few cereal crops (millet and rice) at Koutiala district displayed lower prices in village markets relative to their urban centers. The proximity of M’Pessoba village to the main road and its nearness to Bamako than Koutiala might be a reason for the higher market price observed for millet and rice. Legume crops were found to be more expensive than the cereals. Groundnut prices in urban centers were twice those of the village centers in both districts. To enable farmers benefit from best market prices; it is necessary to provide market price information and facilitate interconnection between farmers and consumers. It is also important to develop storage structures to prevent postharvest losses. Most farmers lack the benefit of price negotiation, which can be a handicap during market transactions. In this case it would be important to build the capacity of farmers’ organizations to function as effective brokers for the benefit of their members.

Figure 4: Market price for cereal and legume crops in Bougouni district

Figure 5: Market price for cereal and legume crops in Koutiala district

**Discussion:**

The socio-economic characterization work conducted in ten farming communities revealed the important role of Farmers Organization (FOs) for development activities. FOs play an important role in terms of knowledge sharing and acquisition of farming equipment that are too expensive for a single farmer to owe (Fert/AFDI Touraine, 2014).¶ Majority of the FOs were engaged to assist member farmers with strict principles, rules and regulations for members to abide by. The objectives of the established FOs in order of importance were *sustainable agricultural development*, *food secu*rity *and income diversification*, and *village socio-economic development*. There were also FOs (7% in Koutiala and 14% in Bougouni) established for cotton production assisted by CMDT.

Our study showed that there was no clear market information regarding major staple agricultural products except for cotton. Cotton price was set by CMDT and most staple crops were either consumed or available for sale in the local market. A recent study (Valerie et al, 2015) indicated that nearly 80 to 90% of cereal crops mainly sorghum and maize were consumed by semi-subsistence farmers and never passes through a market. Markets for major staples remain poorly developed in southern Mali. Besides FOs were not part of the decision to set crops prices but through price bulletins transmitted on radios and visiting local markets, they are able to negotiate with wholesalers or resellers a fair price and reduce risk of a decline in members’ income. However, cotton producing FOs benefitted through incentives by CMDT. This is explained below.

Cotton production was introduced at Sikasso region by the leading state agency, CMDT, in the late 1960s. Before the establishment of the FOs, CMDT helped farmers to produce cotton through village associations (Beauval, 2004). The CMDT, through the availability of inputs particularly the introduction of subsidized fertilizer and the distribution of free seeds (cotton, maize in the 1980s), have greatly contributed to increased production of staple foods and other cash crops such as groundnut and sesame in the study areas (Benjaminsen, 2001). Following the cotton crisis and the privatisation of the CMDT, village associations were transformed into cooperatives/farmers’ organization in 2006. Aside farming practices, FOs contributed to village development through the construction of schools, health centres and wells. These infrastructures were funded by the FOs through surplus made from cotton production (Girard et al., 2008).

Local farmers in the studied villages witnessed a decline in productivity of cereal crops mainly sorghum and millet while maize and rice productivity were increasing. Households in southern Mali were spending a declining share of their cereal budget on sorghum and millet with an increasing share going to maize and rice. Moreover cotton, maize and rice productivity were favoured by national agricultural strategies and investments, which include maize variety improvement programs, extension services and credit systems, investments in irrigation systems for rice production, and re-instated agricultural subsidies for cotton, rice and maize producers (Valerie et al., 2015)

Our study revealed that farmers have no clear criteria for their choice of cropping pattern in the studied villages. Generally farmers’ personal preferences for home consumed cereals and their perceptions of market demand and prices shape their decisions of what crops to grow which in-turn shape market supply (Foster et al., 2015). Cotton was promoted by CMDT through availability of cotton seeds and other inputs, mainly fertilizer and pesticides. This enabled farmers to improve their household income from the sale of cotton. However the erratic rainfall distribution in time and space increase the risk of in-season dry spells that influences cropping choices in general and as result the production potential was low. Yield per hectare was less than 1 ton for most cereal and legume crops in the studied villages.

Among the cereal crops sorghum, millet and maize have long been considered subsistence rather than commercial crops, with an average production (from the total) 13%, 11% and 27% respectively. However, the poor soil fertility compounded by frequent drought events and other yield-reducing factors such as pests, diseases and weeds were challenges to increase crop production resulting-in little income from farming these crops. Further, intensive and extensive cotton production and deforestation have increased the trend of land degradation and water erosion in Southern Mali. Farmers in the studied villages apply a range of local technological practices comprising intercropping, crop rotation and stone and contour bunds as part of farm management practices. Again one notable example here is the effort by CMDT.

Considering the loss of soil and nutrients from farmers’ fields CMDT initiated the program on natural resources management in southern Mali in the early 1990s (Bodnar, 2005).Farmers were trained through village associations by CMDT and encouraged to adopt options of soil and water conservation technologies including stone and contour bunding and composting. Farmers however, apply land and water management technologies only when and where there was a need (Mazzucato et al., 2001). Several studies pointed to lack of technical skills to maintain the soil and water conservation infrastructures and the top down approach used to implement natural resources management programs as reasons behind lack of success in most sub-Saharan Africa’s land management programs (Reij, 1990; Zemadim et al.,2013).

**Conclusion and Recommendation**

Sustainable intensification requires the involvement of local stakeholders and in this case Farmers’ Organizations (FOs) in particular, play a crucial role to facilitate implemented activities and help control agricultural input supplies and products in a more decentralized manner. In the studied farming communities FOs were essential in the access to inputs by members and support the members with loans on demand, food distribution during period of food shortages. The self-help FOs provide mutual assistance to members in need as well. However weak extension services outside cotton, maize and rice production sectors constrain the effort to increase production of major staple crops which could heighten the risk of market prices. There is limited market information on various cereal and legume crop prices, causing significant variations of prices in the urban and village markets. Promoting awareness programs on crop productivity and evolving market conditions is important in this case. Farmers do not have clear criteria to their choice of cropping pattern except for the cotton cash crop. For the other cereal and legume crops, agricultural technology dissemination strategy and adoption techniques were limited. Costs exceed revenues due to low sale volumes and we suggest better agro-advisory services including crop and agricultural input price information through local media, FOs, local extension services, and farmer to farmer information exchange.

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